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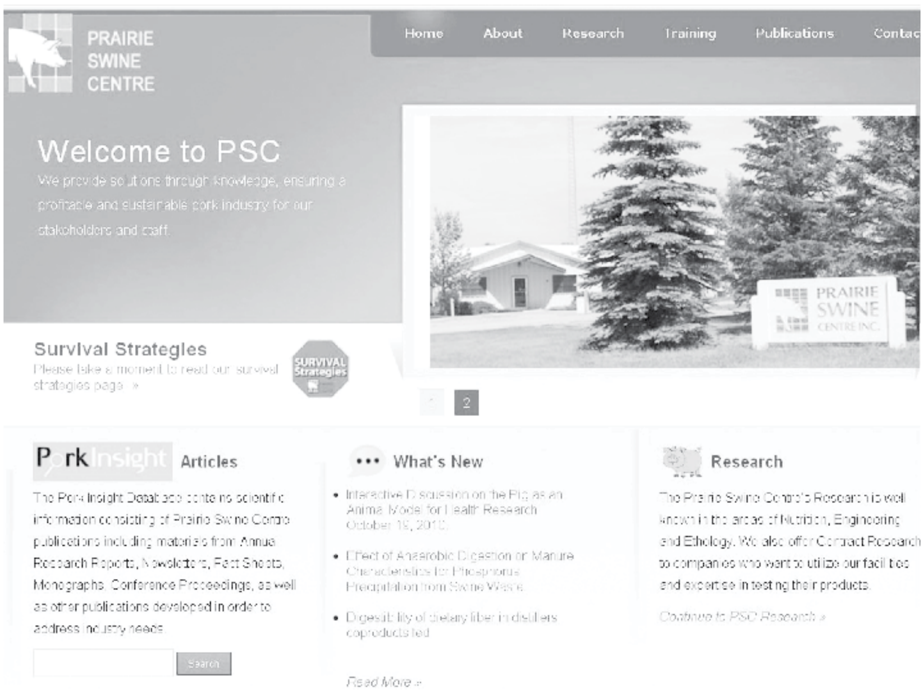
Prairie Swine Centre Website Changes



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President/CEO
Prairie Swine Centre

Prairie swine centre launches a new website. Ease of navigation and broader search compatibility were behind the redevelopment of the centre's website renewal. First launched in 1993, the centre has always maintained a website to ensure stakeholders have easy access to information generated at the centre. In 1997 the first on-line database was added to the site as a way to provide easy sorting and access to the hundreds of new research articles becoming available. The first development contained only 200 articles for the environmental issues resource centre. Today nearly 6000 articles can be found on the website, including summaries of all PSC's work plus research relevant to the Canadian pork industry that we have accessed from all over the world. Now finding that information and accessing summaries, scientific papers, presentations and other materials is much easier with a new search engine.

(PSC Website Changes ... continued on page 7)

Publication # 40010021

Setting Up an Effective Farm Trial

 

Lee Whittington MBA LeAnn Johnston PhD

The pork industry is blessed with a number of innovators. I recall surveys from decades ago that compared the speed of adoption of new technology by the various commodity sectors, and pork producers were always very near the top of the chart. Perhaps it is the rapidity of turnover in the barn that lends itself to seeing a difference in management quickly. Maybe the intensive agricultural systems attract a certain type of person with a curious mind? Whatever the reason, it is without a doubt that all pig farms participate to a greater or lesser extent in experimenting to improve productivity, reduce costs, or make management easier. Sometimes the results of such experimentation are as expected – For example the pigs on the higher energy, more expensive diet grew more quickly. Often however the results, the time and effort and money required to innovate and experiment results in more questions than answers and does not lead to an innovation being adopted on the farm as part of a new long-term management strategy. This paper will help to explain why results are not always what we expect and how to improve your odds of success in future on-farm trials.

Why you should do an on-farm trial

Many new technologies come with all the work completed including the change we can expect, the confidence in the statistical approach used to analyze the test, plus the economic benefit of implementation under a standard set of economic assumptions. So why would you want to take on organizing an on-farm test yourself? There are several reasons to test something on the farm. Typically the top reasons given by innovative producers are:

1) "The proof is in the pudding" or "My situation is different and I don't believe just because it works elsewhere it will work on my farm".

2) "The idea is mine and I don't know of anyone else that has tried it so I need to find out for myself."

3) "I read/heard about this idea from another country and think it might work here."

Yes no two barns are exactly alike, even though they may be designed to operate the same; the people factor adds a unique component that makes a significant difference on the outcome of many practices or products used. For example, we can standardize feeding times, amounts fed and diet formulation but can we be sure the ventilation system is managed the same, or how the pigs are handled is identical? This latter point was reinforced with Paul Hemsworth's work two decades ago where the interaction between the stockperson and pig varied significantly from farm to farm based on the previous handling experience of the animals – some herds were curious and approach, others generally fearful and flee from people. So there are differences between barns and thus reasons to believe that an on-farm trial would produce a more reliable result than information gathered on other farms.

There are of course circumstances that lead us to think it is not necessary to do my own on-farm trial. For example to confirm the effectiveness of a vaccine or pharmaceutical treatment specific to a disease and to test the product would require you to allow an outbreak of the disease on your farm. Not a good candidate for an on-farm trial.

Most on-farm trials have an economic decision they are trying to address. This adds to the complication of the study because the experiment should be able to capture both positive and negative results. What is the benefit we are hoping to achieve and what is the cost to achieve it? The cost is often easy to find (example, feed cost per kg, or drug cost per dose) but the performance result in the barn, the statistically tested part, is much more difficult. A review of any scientific publication will focus on the significant p value. That is, the results are not random and there is a 95% probability that the effect seen from the intervention is from the treatment given ($p < 0.05$). So how do I achieve this level of confidence that the intervention (feed, drug, etc) worked and should be considered as part of my ongoing management of the barn? There are two related questions because not all studies result in a statistically significant conclusion. What if the intervention didn't work – was it the product in question or was the experimental test just not sensitive enough to detect the small improvement? Should I then not use this intervention on my farm? Lastly the results are unclear and other information is required to make the decision. Perhaps the trial was not designed properly and cannot answer the question you ask.

Why on-farm tests often fail

The reasons are many but break down into five main categories (First noted by Deen 2009):

1) The trial design would not provide the answer you seek. This sounds very basic and avoidable but likely accounts for a majority of the on-farm test failures. What happens if the intervention has multiple outcomes? For example, a small improvement in average daily gain, feed efficiency and improvement in one or two carcass features. Do the combined improvements in each of these areas justify the intervention? When the improvement in feed efficiency alone is enough to justify the intervention the answer is clear – adopt the new technology. What if only small gains are made in each area? Likely the reality is the study needs to be redesigned to include many more pigs to identify small gains (increase the

analytical power of the test by having more groups of pigs on trial)? (Deen 2009)

2) Consideration of prior knowledge of the item to be tested and the pig barn we are testing in. If the item we are testing has a history of performance under other circumstances (even in species other than pigs) that gives us a clue as to how big a difference we are seeking to measure. What is the variation located within the test herd prior to the test? This knowledge of health status, quality of pig, and variation in key factors such as daily gain are the inherent background 'noise' within the barn. We need to account for this 'noise' to ensure our test can be interpreted.

3) Danger of believing your test analysis when actually it is worthless. Statistically a negative result of a single study cannot be interpreted as supporting a negative conclusion. This really only means that we are not satisfied 'beyond a doubt' (p<0.05% probability) that the product performed as expected.

4) "A micrometer question is often measured with a 'yard-stick'. …The scale of the economic benefit required to justify an intervention is much smaller than the capability of the statistical test created." (Deen, 2009). Lets use an analogy to explain this concept. If we are trying to measure the impact of a wave of amplitude 1 cm (a daily gain improvement of 20 grams per day) passing through our test population (pig barn) and the variation in the test population is viewed as a wave with amplitude of 1km (days to 120 kg varies from 135-230) you get the idea. There is so much variation already within the population that it would take a large number of data points (pens of pigs) to sort out the effect of the smaller wave.

5) Data collection or the 'people factor'. We could write chapters on examples of tests that never had a chance of answering the original question. The greatest is kindly referred to as planting and harvest disease – known distractions that will occur during the course of the test need to be dealt with in advance. Getting stockpeople on side, arranging additional help to collect information (using summer students in July – is the result valid in January?), not fudging data when it is lost (the pigs ate my homework!), having a backup plan when people unexpectedly leave, having the right measurement tools (is the scale accurate enough to pick up the difference anticipated?) and intervention procedures operating well and checked regularly to ensure they continue to operate as expected over the trial period, all the feed is made and tested prior to the start of the test (remove batch mixing error and eliminates out-of-feed incidents). There are the whole list of other factors such as ventilation error or power failure, out of water events, feeders adjustable to provide uniform access in all pens and avoid waste, what to do if there is a disease outbreak during the test period, effect of weather and changing seasons on feed intake or dunging patterns, stable parity distribution within the breeding herd, pigs jumping from one pen to another …

One sidebar to the people factor is "when you start to measure something, it generally begins to improve" (Krueger, 2009). For example, when daily feeder and waterer checks are consistently made and acted on, the results of all groups will likely improve because the 'normal' out-of-feed events (typically 10% of all feeders in the barn) do not occur during the test period.

"when you start to measure something, it generally begins to improve" (Krueger, 2009).

How to Avoid Common Pitfalls when setting up your on-farm trial

1) Do the math first. How many groups of pigs will it take to have confidence (sufficient power in the statistical test) that the difference I am trying to measure can be assessed from my trial design? This can be the subject of a graduate course but if you have the patience and interest some free software on line can help such as www.stat.uiowa.edu/power/index.html, www.winepiscope, www.youtube.com/watch?v=PbODigCZql8

2) Calculate the likely financial benefit of a successful trial. Will it be sufficient to justify the work and cost of conducting the trial? Most businesses will want a 3:1 return on new investment because they realize that biological systems don't always behave as predicted all the time, so can I expect a $3 return from a $1 intervention?

3) Get the people involved. Everyone that plays a role needs to be aware of the cost and the large risk of failure to complete the trial as designed.

4) Use a checklist like the one attached to plan your successful trial implementation.

The Bottom Line

There are many sources of new ideas and technologies awaiting pork producers. Assessing their economic value and appropriateness for your farm should begin with taking the easy route first and looking for third-party verifiable test results that give you confidence the results are repeatable and sufficient to provide a positive economic return under current economic circumstances.

If reliable information does not exist but you believe the potential economic benefit is too great to ignore, and you have adequate resources to design and implement an on-farm test then use the *Designing your on farm trial - A checklist for success* trial checklist to increase your chances for success.

References

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Behaviour of Pigs in Large Group Auto-Sort


H. W. Gonyou PhD   Jen Brown PhD

Large group auto-sort (LGAS) systems require considerably more effort on the pigs' part to access feed than in small pens. We studied the pigs' behaviour in two LGAS systems to determine what adaptations they made. Pigs were able to maintain their typical diurnal eating pattern, with peaks at 'lights-on and lights-off' as seen in small pens. However, the pigs modified their eating by having fewer (5 vs 10-15) but longer meals than in small pens. Pigs made use of all of the available feeder spaces within the food court, visiting several each day. Although able to adapt their eating behaviour to the large group system, some had difficulty learning to enter and leave the food court several times a day. Management should ensure an adequate number of feeder spaces, sufficient room to move in the food court, and training methods to facilitate use of the auto-sort scale.

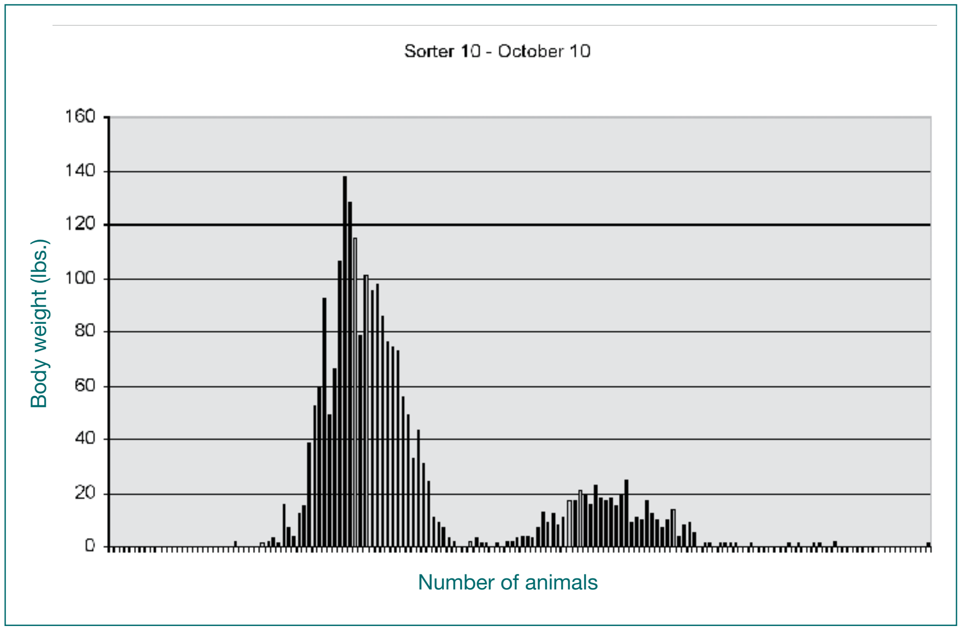


Figure 1. Distribution of weights recorded by sorter during period when pigs averaged approximately 45 kg (98 lbs). Second cluster to right represents times when two pigs were in the scale. Weights in lbs.

> Pigs in large groups adapt their feeding behaviour by having 5 longer meals per day rather than 10 to 15 meals per day in small pens, but performance is similar in both groups.

INTRODUCTION

The use of large groups for grow/finish pigs makes it economically feasible to introduce new technology, such as auto-sort scales, into pig production. One of the initial fears concerning large groups of pigs was that they would fight longer after being put together. Our earlier research refuted these concerns as aggression per pig at group formation was similar in small and large groups, and in fact, pigs from large groups proved easier to combine with other pigs when marketed. However, early attempts to use auto-sort technology encountered problems with variable feed intake among the pigs. We continued our studies with a focus on eating behaviour.

EXPERIMENTAL PROCEDURES

Studies were carried out at two locations; the PSC Elstow Research Farm and a commercial grow/finish operation. The Elstow facility housed approximately 250 pigs in its LGAS (with 1 feeder space per nine pigs). The commercial farm maintained groups of 650 pigs with 60 feeder spaces. At the Elstow facility we studied the diurnal pattern of scale use, the use of individual feeder spaces within the food court, and the eating patterns of individual pigs. Movement through the scale ('hits') were studied using automated output from the auto-sort scale. We photographed all of the feeder spaces at 5 min intervals using a time lapse camera. To identify individual pigs, 10 pigs in each study group were paint-marked. At the commercial farm, we again used output from the auto-sort scale, and supplemented this with live observations of four rooms of pigs for a 24-hr period.

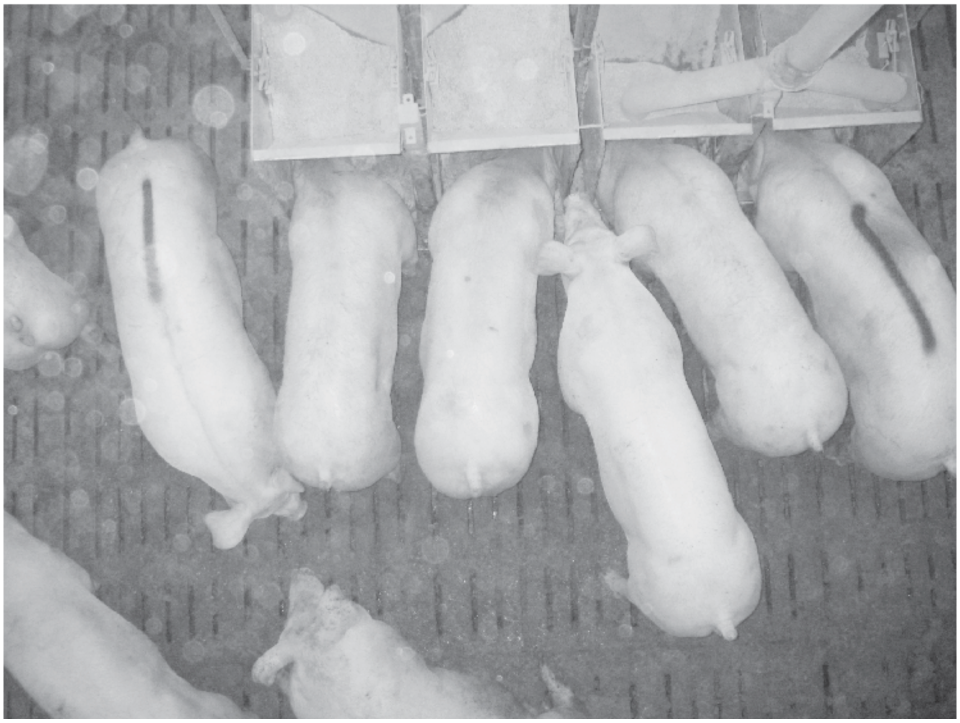


Figure 2: Example of photo used to assess eating patterns and feeder use.

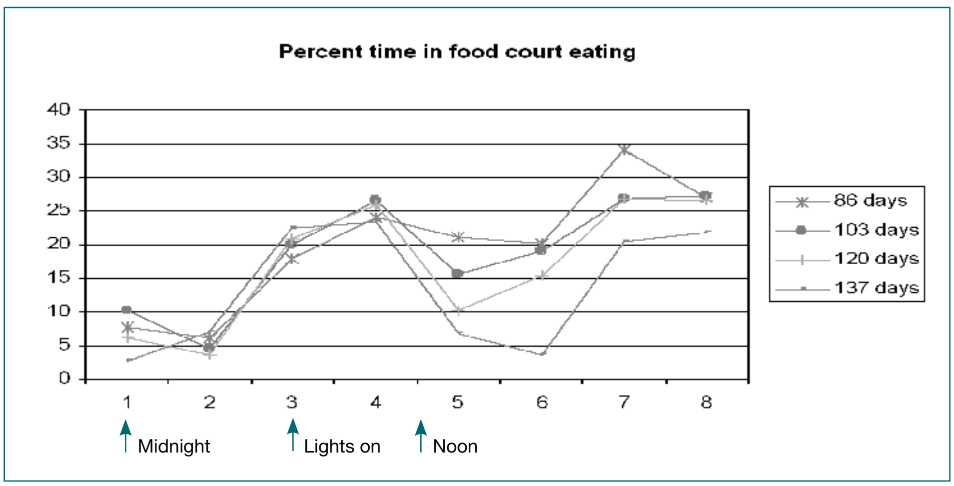


Figure 3: Diurnal pattern of eating by pigs within the food court in auto-sort rooms with different aged pigs. The day was divided into eight 3-hr periods, starting at midnight.

RESULTS AND DISCUSSION

Pigs normally have a diurnal eating pattern with most of the feeding taking place during the 'day'. When we first examined the pattern of 'hits' through the auto-sort scale the entry pattern was poorly defined. However, we determined that during the daytime, and when pigs were less than 75 kg, two pigs would often enter the scale at the same time (Figure 1). After adjusting the data for the number of pigs that entered the food court each hour, a more distinct diurnal pattern was found.

The analysis of photos of the feeder spaces (Figure 2) showed a clear diurnal pattern with an 8-fold increase in eating during the daytime peaks compared to the midnight low. The pattern showed typical peaks at 'lights-on' and 'lights-off'. The pigs used each of the feeder spaces fairly uniformly, something we had observed in previous studies. Pigs in small groups typically have 10 – 15 well defined 'meals' in a day. Pigs in the LGAS had approximately 5 meals per day, but they were longer in duration than in small group pens. This adaptation was successful as the pigs in LGAS performed as well as those in small groups.

The study at the commercial farm allowed us to examine the change in eating behaviour as pigs aged. Our study rooms varied in age by six weeks. We determined that the average number of entrances into the food court each day decreased as the size (age) of the pigs increased, from nearly 4 entries per day at 40 kg to approximately 2.5 per day at 90 kg. The pattern of eating showed the typical diurnal, two-peaked, pattern described earlier (Figure 3). Of interest in this pattern was that younger pigs had less of a 'drop-off' in the middle of the day. Comparing these results with other studies suggests that the younger pigs were limited in the number of feeder spaces, and had to shift eating from the normal peak periods to the less intensive mid-day period.

The Bottom Line

Large group auto-sort systems pose some significant challenges to pigs in terms of eating behaviour. The feeders are all located in a food court which can only be accessed through a single sorter scale. The cost of moving to the feeders is greater than in a small pen, where pigs may only have to move a metre or so to find feed. Despite these restrictions, pigs pass through the sorter and eat in a typical diurnal pattern similar to that seen in small pens. However, pigs in large group auto-sort pens only enter the food court 2-4 times each day, and have fewer meals (5 vs 10-15) than in small pens. They compensate by eating longer during each meal. They also move freely about the food court, eating from several feeder spaces every day. Young pigs, who require more time to eat, may display a higher mid-day rate of eating indicative of restricted feeder space. We believe a key to making food courts work is to make sure the pigs know that food is present by introducing them to the food court rather than the loafing area. The food court should be spacious so that pigs have access to all of the feeders, and a feeder space should be provided for every 10-12 pigs.

Acknowledgements: Project funding provided by the Agricultural Development Fund of Saskatchewan. Collaboration of Sierens Equipment as well as that of the commercial farm was greatly appreciated. Strategic funding was provided by Sask Pork, Alberta Pork, Manitoba Pork Council and Saskatchewan Agriculture to the research programs at PSCI

Canola oil sprinkling and low crude protein diet reduce respirable dust and ammonia concentrations from swine production

Y. Jin PhD B. Predicala PhD

Tests over a nine-month monitoring period evaluated the effect of canola oil sprinkling and low crude protein diet on ammonia (NH3) and respirable dust concentrations.

The test was conducted in six swine grow-finish rooms with partially slatted floor; each 5.49 x 14.63 m room has six pens with a total capacity of 72 pigs. Each treatment, namely canola oil-sprinkling, low crude protein diet, and control (no measures), were applied to two rooms each. (No changes from typical production)

Pigs were moved into the rooms from nursery at about 20 kg and were taken to market weight of about 120 kg after 14 to 15 weeks. Except for the two rooms given the experimental low crude protein diet, all pigs were fed identical diets.

A variable sprinkling schedule was followed from the same day of admission of pigs into the rooms: 40 ml/m^2/d for the first two days, 20 ml/m^2/d for the third and fourth days, and 5 ml/m^2/d for the succeeding days. Dietary crude protein was reduced by adding supplemental

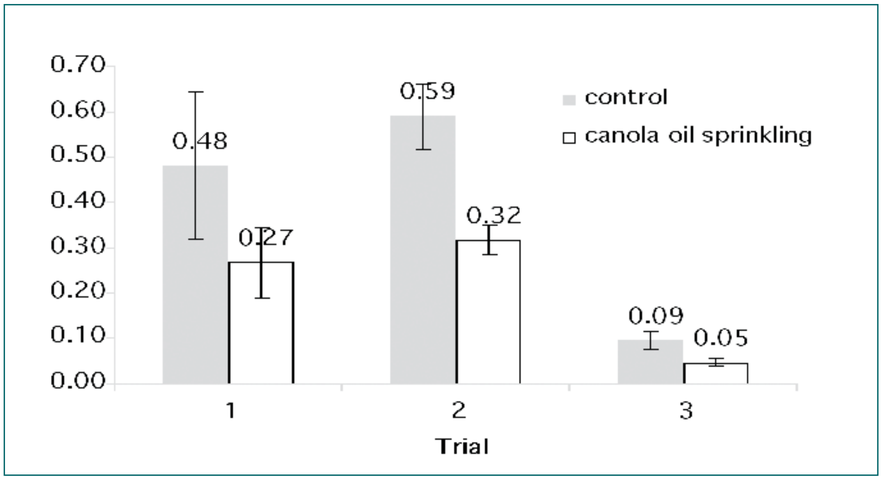


Figure 1. Respirable dust concentrations measured in the control and experimental rooms

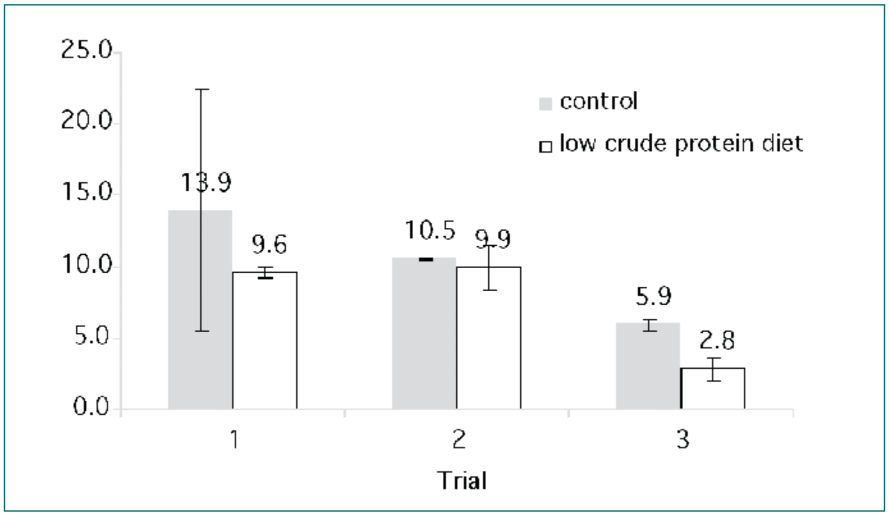


Figure 2. Ammonia concentrations measured in the control and experimental rooms (NIOSH method).

amino acids to the normal diet such that the amino acid requirement of the pigs were achieved with concomitant reduction in dietary N.

Each trial was run for 16 weeks, which includes two weeks of animal and room preparation at the start of each trial and 14 weeks of data collection. Ammonia and respirable dust concentration were measured by area sampling according to National Institute of Occupational Safety & Health (NIOSH) 6015 and 0600 methods (NMAM, 1994), respectively. Ammonia concentration was also measured using commercial gas monitors (GasBadge Pro, Industrial Scientific). The pigs were weighed at the start (week 0), middle (week 6) and end (week 12) of each trial to determine the average daily gain. Ammonia and dust concentration were measured every three weeks (week 2, 5, 8, 11, and 14) for two consecutive days.

The results plotted in Figure 1 shows that the respirable dust concentration in the room sprinkled with canola oil (mean=0.18 mg/m3, SD=0.19) is significantly lower (P=0.036) than in the control room (mean=0.33 mg/m3, SD=0.39). This was expected based on previous tests.

The ammonia concentrations measured using the NIOSH method in the room given low crude protein diet (mean=4.2 ppm, SD=2.3) were significantly lower (P<0.01) than the control (mean=6.3 ppm, SD=2.0) (Figure 2).

The Bottom Line

Canola oil sprinkling and use of low crude protein diet resulted in significantly lower respirable dust and ammonia concentrations, respectively. The findings from this study would aid pork producers in implementing these measures to improve the barn environment for animals and workers.

Acknowledgement: Project funding was provided by Manitoba Livestock Manure Management Initiative. Strategic program funding provided to Prairie Swine Centre Inc. by the Saskatchewan Pork Development Board, Alberta Pork, Manitoba Pork Council and Saskatchewan Ministry of Agriculture is also acknowledged.

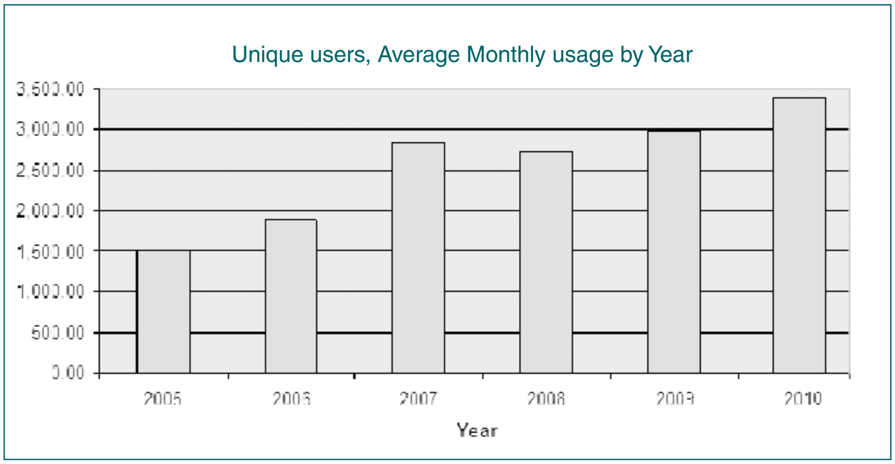
(PSC Website Changes ... continued from page 1)

Pork producers continue to look for more efficient ways to manage their farms. The practical information found on the PSC website seems to meet that need as we look at the steady increase in users coming to the website year over year for the past 5 years.

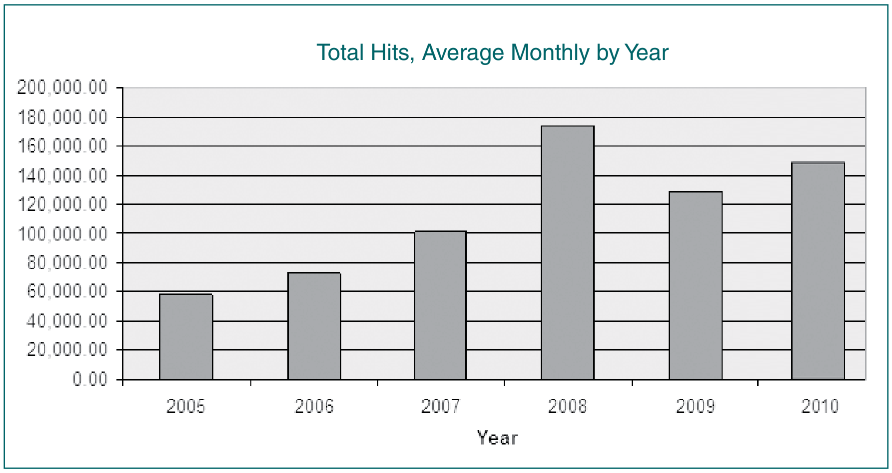
"During the past 3 years it has been all about looking for ways to reduce production costs" notes Lee Whittington, President of Prairie Swine Centre." The website provided a way to communicate a large amount of detailed information efficiently. The Survival Strategies checklist will remain an important feature on the website, the big STOP sign icon is a quick way to access easy to use checklists producers could use to do a thorough review of the operating conditions within each barn.

We are constantly adding new information to the website and publish an update of interesting new material every two weeks via an email reminder. If you would like to receive this email just send a message to Lee.whittington@usask.ca with message line "Add me to Prairie Swine Centre Ezine list".

Thank you to our ongoing program funders Sask Pork, Alberta Pork and Manitoba Pork Council, and Saskatchewan Ministry of Agriculture, ADF Fund. Project funding for the website redevelopment has been provided by ALMA and ACAAFS.



Unique Visitors represent the number of individual viewers to the website. The number of visitors using the PSC website has increased steadily over the past 5 years, this at a time when the industry has been declining in number of farms. Pork producers have come in increasing numbers to the website seeking new information to reduce costs and improve productivity in the face of declining market prices since 2007.



The number of 'hits' reflects the number of pages and images viewed by visitors. Although not as accurate as tracking Unique Visitors, the total traffic on the website can be monitored through 'hits'. The peak in 2008 suggests that when visitors came to the website during the lowest point in the pig price cycle they spent more time surfing the site to find information.

The response of piglets to phase one diets during the first two weeks in the nursery is not affected by creep feeding or weaning weight.

Denise Beaulieu PhD

Average litter size on swine farms in Saskatchewan has increased from approximately 10.4 to 11.2 piglets in the past 5 years. Further improvement is expected and moreover is required, to maintain competitiveness of the industry in Western Canada. Research conducted recently at PSCI showed that as litter size increased from 8.4 to 15.4 pigs born alive, average birth weight decreased by approximately 250 grams, or almost 40 grams per additional pig. The number of pigs less than 850 grams increased from 0.2 per litter in the small (5 to 12 piglets) litters to almost 1 per litter in the largest (16 or more born alive) litters. It is apparent that as litter size continues to increase it is crucial that these small pigs survive and go to market or we will lose the benefits of the large litters.

The period immediately post-weaning is characterized by problems such as low feed consumption, poor growth rate, and increased incidence of diarrhea (Levesque et al. 2002). Reducing the interval between weaning and resumption of feed consumption can mitigate these issues, thus the piglet must be encouraged to begin consuming solid feed upon entering the nursery.

Our objective was to examine factors which may limit resumption of solid feed in the nursery. Factors examined included provision of creep feed in the nursery, diet quality, and piglet bodyweight at weaning.

Fifteen nursery fills were studied. Each nursery (32 pens, 4-5 pigs per pen) was filled with the piglets from one weeks' farrowing (four week weaning). We used only 12 pens, 6 for the lightest, and 6 for the heaviest pigs from the weaning group. Within each body-weight grouping, these 6 pens were then assigned to one of 3 treatments (Table 1). Thus within each nursery we had 2 pens per treatment, per body-weight grouping. Pens were mixed gender, and contained at least 2 pigs of one gender. Farrowing groups 1 to 8, received creep feed (a non-medicated phase 1 starter) for one week prior to weaning. Groups 9 to 15, received no creep feed.

Table 1. Treatment regimes

Treatment	Feeding regime
A	Complex diet day 0 to 1, Simple diet day 2 to 14
B	Complex diet day 0 to 4, Simple diet day 5 to 14
C	Simple diet day 0 to 14

Diets (Table 2) were formulated to meet or exceed amino acid, energy, vitamin and mineral requirements for pigs of this age and bodyweight (NRC 1998). The "complex" diet used corn instead of corn DDGS and contained whey, plasma, blood meal and fish meal, while the "simple" diet met requirements using wheat, soybean meal, canola meal and corn DDGS. The simple diet would thus be much "cheaper" to manufacture. While both diets met all the nutrient requirements for piglets of this age and weight, ingredients in the complex diet should supply additional benefits such as improved palatability and aiding the immune system. We hypothesized that the complex diet would be especially beneficial for lightweight piglets and those who had not received creep in the farrowing room.

The three treatments were A: the complex diet only on day 1, B;, the complex diet on the first 4 days, followed by the simple diet, and piglets on treatment C only received the simple diet.

Surprisingly dietary regime had no effect on piglet performance during the first 14 days in the nursery (Table 3, BW d 14, ADG, ADFI and FCE day 0 to 14 all P > 0.05). Additionally, regardless of whether the piglets received creep in the farrowing room, or were of light or heavy weaning weight, provision of simple or complex diet had no effect on performance during the first 14 days in the nursery (Table 4, BW d14, ADG, ADFI and FCE day 0 to 14, creep by diet and BW by diet interactions, P > 0.05).

(The response of piglets... cont'd on page 11)

Table 2. Ingredient composition of experimental diets

Ingredient, %	Complex	Simple
Wheat	24.20	29.86
Corn	20.00	
Soybean meal	16.90	25.00
Peas	10.00	10.00
Canola meal	------	7.80
Corn DDGS	------	20.00
Fish meal	5.00	------
Spray dried whey	14.29	------
Spray dried plasma	2.50	------
Spray dried blood meal	2.50	------
Canola oil	1.75	2.80
Limestone	0.70	0.85
Dicalcium Phosphate	0.15	1.15
Salt	0.25	0.40
Vitamins	0.60	0.60
Minerals	0.60	0.60
DL methionine	0.130	0.090
L-Threonine	0.190	0.245
Lysine HCl	0.020	0.385
Copper sulphate	0.04	0.04
Choline chloride	0.08	0.08
LS20	0.10	0.10
Cost per tonne, Nov 2010	723.00	344.00

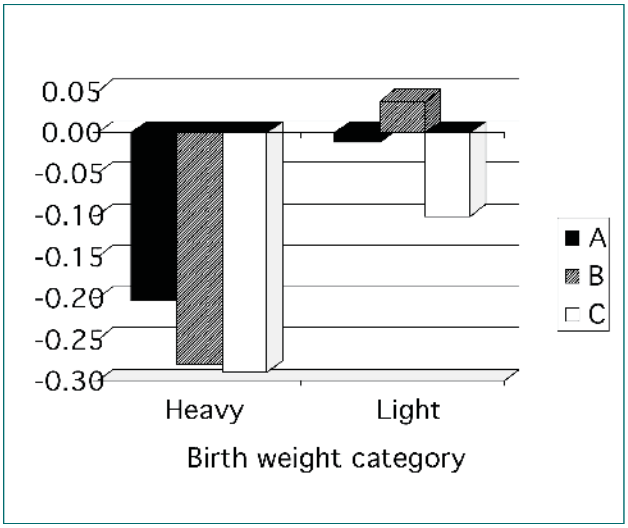


Figure 1. The interaction between birthweight and feeding regime on the growth weight of piglets day 0 to 1 post-weaning. Treatment A and B piglets were receiving the complex diet and treatment C piglets the simple diet during this period.

Table 3. The effect of feeding regime (diet complexity) on performance of weanling pigs. Average of 60 pens per treatment, 4 pigs per pen.

Parameter		Dietary Treatment A	B	C	SEM	P value
Body wt, kg	Day 0	8.43	8.43	8.42	0.07	0.92
	Day 1	8.33	8.32	8.22	0.08	0.07
	Day 4	8.47	8.89	8.44	0.08	<0.0001
	Day 7	8.79	9.19	8.79	0.10	<0.0001
	Day 14	10.95	11.25	11.11	0.17	0.14
ADG, kg/day	Day 0-1	-0.11	-0.12	-0.20	0.02	0.002
	Day 2-4	0.03	0.14	0.06	0.01	<0.0001
	Day 5-7	0.14	0.12	0.14	0.01	0.21
	Day 5-14	0.27	0.25	0.28	0.01	0.04
	Day 0-14	0.17	0.20	0.19	0.01	0.14
ADFI, kg/day	Day 0-1	0.12	0.12	0.08	0.01	0.002
	Day 2-4	0.10	0.17	0.12	0.01	0.0001
	Day 5-7	0.20	0.25	0.20	0.01	0.001
	Day 0-14	0.24	0.27	0.25	0.01	0.002
	Day 5-14	0.31	0.33	0.31	0.01	0.16
FCE, as G/F	Day 0-1	-2.29	-4.11	-3.74	0.62	0.08
	Day 2-4	0.03	0.82	0.40	0.12	0.0001
	Day 5-7	0.68	0.52	0.68	0.04	0.0001
	Day 0-14	0.71	0.70	0.73	0.04	0.31
	Day 5-14	0.86	0.75	0.89	0.02	0.0001

Table 4. The effect of body weight at weaning or feeding creep in the farrowing room and the interactions of body weight, creep feed and feeding regime (table 1) on the performance of weanling pigs. Average of 90 pens per treatment, 4 pigs per pen.

		Body Weight Group				Creep Feed				P value, Interactions		
		Heavy	Light	SEM	P value	No	Yes	SEM	P value	Creep*BW	Creep*Diet	BW*diet
Body wt, kg	Day 0	10.40	6.44	0.07	<0.0001	8.36	8.49	0.10	0.35	0.01	0.96	0.98
	Day 1	10.15	6.42	0.07	<0.0001	8.23	8.33	0.10	0.49	0.02	0.72	0.39
	Day 4	10.42	6.76	0.08	<0.0001	8.56	8.61	0.11	0.75	0.05	0.59	0.69
	Day 7	10.71	7.13	0.10	<0.0001	8.88	8.96	0.14	0.70	0.23	0.59	0.35
	Day 14	12.73	9.48	0.16	<0.0001	11.17	11.04	0.21	0.67	0.85	0.10	0.14
ADG, kg/day	Day 0-1	-0.26	-0.03	0.02	<0.0001	-0.12	-0.16	0.02	0.36	0.79	0.41	0.01
	Day 2-4	0.07	0.08	0.00	0.04	0.08	0.07	0.01	0.43	0.60	0.64	0.63
	Day 5-7	0.12	0.15	0.01	0.001	0.16	0.12	0.02	0.11	0.84	0.88	0.88
	Day 0-14	0.16	0.21	0.01	<0.0001	0.20	0.17	0.01	0.05	0.63	0.12	0.15
	Day 5-14	0.25	0.29	0.01	<0.0001	0.29	0.25	0.01	0.03	0.59	0.12	0.13
ADFI, kg/day	Day 0-1	0.09	0.13	0.01	<0.0001	0.12	0.10	0.01	0.10	0.42	0.38	0.03
	Day 2-4	0.13	0.13	0.01	0.01	0.13	0.13	0.01	0.77	0.68	0.74	0.69
	Day 5-7	0.22	0.21	0.01	0.72	0.22	0.21	0.01	0.88	0.80	0.09	0.59
	Day 0-14	0.25	0.25	0.01	0.83	0.26	0.25	0.01	0.33	0.59	0.16	0.16
	Day 5-14	0.32	0.32	0.01	0.81	0.33	0.30	0.01	0.03	0.42	0.10	0.15
FCE, as G/F	Day 0-1	-5.36	-1.37	0.62	<0.0001	-2.51	-4.19	0.59	0.06	0.33	0.69	0.48
	Day 2-4	0.40	0.44	0.10	0.84	0.39	0.44	0.10	0.75	0.21	0.44	0.51
	Day 5-7	0.43	0.71	0.04	0.001	0.69	0.57	0.06	<0.0001	0.11	0.87	0.59
	Day 0-14	0.59	0.82	0.04	<0.0001	0.77	0.67	0.05	0.05	0.56	0.13	0.84
	Day 5-14	0.70	0.91	0.02	<0.0001	0.86	0.81	0.02	<0.0001	0.34	0.19	0.57

DON in Swine Diets

LeAnn Johnston PhD

Why it is important now

The cool, wet weather we experienced this summer has caused many problems for the farmers in this area. This fall there is one more – there are reports of grain that is contaminated with fusarium mould.

Deoxynivalenol (a.k.a. DON, vomitoxin) is a mycotoxin that can be produced when fusarium moulds contaminate cereal grains, including wheat, barley, and corn. Pigs are more sensitive to DON contamination in their feed than other farm animals. Growing beef cattle, sheep, and poultry have an Agriculture Canada Guideline of 5 ppm, while the guideline for pigs is 1 ppm (1 mg/kg) .

The most common symptom pigs show when given DON contaminated feed is a reduction of feed intake and a corresponding decrease in weight gain. Some decrease in feed intake will likely be seen if DON contamination exceeds 1 ppm. In research conducted at the Prairie Swine Centre, feed intake and daily gain of late-nursery pigs decreased 9.1 and 5.2%, respectively, when pigs were fed diets containing 1.57 ppm DON for 22 days. Although pigs may vomit at high levels of DON contamination (~20 ppm) it is more likely that they will refuse feed completely (~12 ppm) before that occurs.

Younger animals will be more severely affected than older animals. While the general recommendation for swine is to limit DON in diets for pigs to less than 1 ppm, a maximum of 0.5 is preferable for nursery pigs. While there doesn't seem to be direct negative reproductive effects from feeding DON contaminated diets to breeding stock, the reduced feed intake itself may be a problem. Therefore, DON contaminated feeds should be avoided in diets for breeding stock whenever possible.

Cross contamination

Often when feed is contaminated with one type of mycotoxin another type will also be present. For example, feed contaminated with DON can also be contaminated with zearalenone, another mycotoxin caused by fusarium. As with DON, zearalenone affects pigs more than other farm animals. Zearalenone has estrogenic effects and when present in the feed causes vulva enlargement in pre-pubescent gilts, as well as decreased litter size and infertility. Keep zearalenone concentrations under 0.5 ppm for all swine and avoid using zearalenone contaminated grains altogether in diets for breeding and replacement swine.

Sampling

It is difficult to get a good sample of grain to test for mycotoxin contamination. There is usually a great deal of variation in the amount of mycotoxin present from one area to another within a truck or bin. Therefore, it is easy to get false negatives or lower or higher values than is actually present in the overall grain. Combining small samples from several different areas will help you

(The response of piglets ... continued from page 9)

There was an interesting interaction between diet and body weight category on growth rate immediately post-weaning (Figure 1). Piglets which were heavier at weaning, lost weight during the first day post-weaning regardless of diet complexity. In contrast, piglets which were lighter, and receiving a complex diet maintaintained their BW (BW group by diet, day 0 to 1; P = 0.01).

Piglets which were heavier at weaning were still heavier by day 14, however, their rate of gain was actually less than the light weight piglets (Table 4) and thus the difference between the heavy and light weight piglets was less by day 14 than at day 0. This is apparently due to greater feed efficiency of the light weight piglets as feed consumption was similar. Feed efficiency values on the first couple of days of a nursery trial are very difficult to intepret and misleading. Piglets were not fasted before weighing and gut fill or defecation prior to or shortly after weighing can have a marked effect. Additionally, the negative gain seen in the first day after weaning, despite some feed consumption (or wastage) results in the negative gain to feed ratio.

Another suprising obseration in this study was the lack of response to creep feeding. We hypothesized that piglets receiving creep feeding in the farrowing room would more readily consume solid feed in the nursery, this was not the case. Moreover, diet regime had no effect on this observation. Piglets fed creep averaged 130 grams more than those not receiving creep in the farrowing room (P = 0.35). We selected the heaviest and lightest piglets from each farrowing group. When all piglets are included, those fed creep averaged 150 grams more than those not fed creep (four week weaning).

The Bottom Line

In conclusion, feeding a simple diet , formulated to meet all nutrient requirements, did not reduce growth of piglets in this trial when compared to a complex diet fed for 1 or 4 days post-weaning. Switching from a complex to a simple diet after one day reduced feed intake to a greater extent than switching after 4 days post-weaning.

The complex diet was approximately $380 per tonne more than the simple diet. Feeding regime B would cost about $0.35 more per piglet than A, and $0.38 more per piglet than feeding regime C. We expect this difference to be greater if the piglets are housed in a more competitive environment, and have a less than ideal health status.

(DON in Swine Diets ... continued from page 10)

be sure that a representative sample has been obtained. The following (Table 1) is an example of our sampling data from 10 different 1-tonne totes of corn obtained from a single source. It is difficult to get a good sample of grain to test for mycotoxin contamination. There is usually a great deal of variation in the amount of mycotoxin present from one area to another within a truck or bin. Therefore, it is easy to get false negatives or lower or higher values than is actually present in the overall grain. Combining small samples from several different areas will help you be sure that a representative sample has been obtained. The following (Table 1) is an example of our sampling data from 10 different 1-tonne totes of corn obtained from a single source. The differences between labs may be partially explained by differences in procedures and timing of analysis.

What to do

There are no feed additives approved in Canada to decrease the impact of DON on swine. Cleaning grain to decrease dust and small shrivelled kernels helps lower the concentration of DON in the grain. If possible, feed contaminated grains to less sensitive species and use clean grains in swine diets.

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K. Dupchak. Feeding Fusarium-Contaminated Grain to Livestock. http://www.gov.mb.ca/agriculture/livestock/nutrition/bza00s01.html accessed 29/09/2010

CAST. Mycotoxins – risks in plants, animal, and humans. 2003. Ames, Iowa, USA.

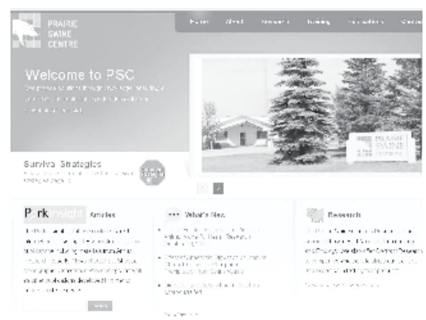
Fast Facts

Mould produces mycotoxins but high mould content doesn't mean mycotoxins are present and mycotoxins can be present when there is no longer any mould.

Not all moulds produce mycotoxins.

Swine are the farm animal most sensitive to DON (a.k.a. Deoxynivalenol, vomitoxin).

Limit DON to less than 1 ppm in diets for swine.



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Personal Profile

Alvin Alvarado

Alvin Alvarado is the new Engineering graduate student who will continue the work on investigating the use of nanoparticles for controlling emissions from manure slurry. He started on his M.Sc. program at the Department of Agricultural and Bioresource Engineering this January 2009. He obtained his undergraduate degree in Agricultural Engineering (with honors) from Leyte State University, Philippines in 2005 and was the top student in the Philippine licensure examination for professional agricultural engineers in the same year. Alvin worked as an Instructor in the same university where he taught courses in Algebra, Trigonometry, Calculus, and Physics prior to coming to Saskatoon.

Yaomin Jin

Yaomin Jin is a research associate responsible for conducting studies on environmental issues related to swine production for Prairie Swine Centre Inc. Prior to joining the centre, Dr. Jin was a postdoctoral researcher at Purdue University, where his responsibilities included operating and maintaining national air emission monitoring study sites (swine and dairy barns in Indiana), analyzing aerial emissions data, and evaluating feasibility of biofiltration technology for swine barns. He obtained his Ph.D. from University of La Coruna in Spain. His study focused on biotechniques for air pollution control. He received a B.Sc. and a M.Sc. from Zhejiang University of Technology in 1996 and 2001. He has another M.Sc. from Delft University of Technology in the Netherlands.

Coming Events

Banff Pork Seminar
January 18-21, 2011
Banff Alberta

Manitoba Swine Seminar
February 2-3, 2011
Winnipeg Manitoba

Alberta Pork Congress
March 16-17, 2011
Red Deer Alberta

Livestock Expo Saskatchewan
April 12-13, 2011
Saskatoon, Saskatchewan

Ontario Pork Congress
June 21-22, 2011
Stratford, Ontario

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